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Entry of the foregoing amendments and reconsideration of this application in view of the remarks that follow is requested. By this amendment, claims 8, 9, and 13 have been amended to more accurately reflect dependency. Claims 1, 3-11, 13-18, 20 and 21 remain pending in the application.

Claim Objections

The Examiner has objected to claims 8, 9, 13 and 14 as improperly depending from cancelled claims 2 and 12. The Applicant in response has amended the claims to reflect proper dependency.

Claim Rejections – 35 U.S.C. § 102

The Examiner has rejected claims 1, 3, 5-8, 11, 13-16, 18, 20 and 21 under 35 U.S.C. 102(b) as being anticipated by Furuya et al. (JP 06-111838) hereinafter referred to as Furuya. The Examiner in making this rejection states that with regard to claim 1 and claims 3, 5-8, and 10 depending therefrom that Furuya discloses an apparatus including a three-dimensional, multi-layer, integral, sintered, monolithic ceramic carrier structure, and specifically refers the Applicant to FIGs. 1 and 2, and sections [0017], and [0030]-00031] of the disclosure. The Examiner additionally asserts additional elements are disclosed by Furuya.

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With respect to claim 11 and claims 13-16 depending therefrom the Examiner states that Furuya discloses an apparatus including a three-dimensional, multi-layer, integral, sintered, monolithic ceramic carrier structure, and specifically refers the Applicant to plates 1 and 2 comprising materials having high thermal conductivity, including sintered ceramic, and to FIGs. 1 and 2, and sections [0017], and [0030]-[0033] of the disclosure. The Examiner additionally asserts additional elements are disclosed by Furuya.

With respect to claim 18 and claims 20 and 21 depending therefrom the Examiner states that Furuya discloses an apparatus including a three-dimensional, multi-layer, integral, sintered, monolithic ceramic carrier structure, and specifically refers the Applicant to plates 1 and 2 comprising materials having high thermal conductivity, including sintered ceramic, and to FIGs. 1 and 2, and sections [0017], and [0030]-[0033] of the disclosure. The Examiner additionally asserts additional elements are disclosed by Furuya.

The Applicant asserts that Furuya discloses a reactor built using discrete pieces of materials to form the plates, with catalyst deposited on them prior to sealing into a packaged assembly. Furuya utilizes discrete pieces to assemble the unit, which according to paragraph [0010], includes the "laminating of two or more plates". The Applicant asserts that throughout the disclosure of Furuya it is stated that these discrete pieces are simply "laminated". The Applicant asserts that paragraph [0030]-[0033] as referred to by the Examiner, describes the sintering of a catalyst support layer within a formed channel, to the plate itself. The disclosure

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fails to disclose the sintering of the plurality of components that make up the final assembly.

The Applicant asserts that Furuya discloses a very cumbersome method of making the reformer unit that is comprised of discrete layers that are simply packaged together. The end result is not sintered as is the device claimed by the Applicant. The Applicant asserts that the system of Furuya uses discrete pieces of metal or ceramic and joins them together subsequent to the fabrication of channels having a catalyst disposed therein. The channels are formed in the plate and then the catalyst material is deposited, prior to the plates being laminated together to form the structure. The Applicant asserts that the reforming catalyst is a low temperature catalyst and will oxidize at high temperatures (i.e. the Applicant sintering temperature). Accordingly, the Applicant asserts that the structure of Furuya is not "a sintered, monolithic structure" as claimed by the Applicant, and that the disclosure actually teaches away from the sintering of the plurality of layers in that the reforming catalyst is included prior to assembly. The disclosure of Furuya states the use of glass sealing, or the like, to join the different plates (ceramic, silicon) together. As stated in paragraph [0059] of Furuya, "as shown in drawing 1, the laminating of the plate 1 and plate 2 which were obtained by the above-mentioned method was carried out by turns one by one, sheathing was twisted with glass wool and aluminum foil, and the reforming machine was obtained". Accordingly, the Applicant asserts that the assembly of Furuya is not sintered in the manner of the Applicant's device. Additionally, some similar type of brazing is utilized for the laminating of metal pieces in Furuya. The Applicant asserts that due

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to the simple laminating procedure of these discrete pieces, the device remains susceptible to leakage of gas, liquid, etc.

In contrast, the Applicant discloses forming the structures in the green state using multilayer ceramic technology so that subsequent to sintering, a monolithic structure is formed. The Applicant asserts that this type of monolithic structure eliminates any leakage of gas, or liquid that flows through the structure. In addition, this method of forming the device out of green sheets with subsequent sintering of the multiple layers provides for ease and accuracy in alignment of the channels formed therein, due to ceramic alignment during processing.

The Applicant does not provide for the catalyst inclusion prior to sintering and forming a monolithic unit. In the Applicant's device, a reforming section cavity is formed during processing, and later is filled with a catalyst powder for reforming. Most steam reforming catalysts are base metal catalysts and they are difficult to deposit and process along with the fuel processor structure in that they tend to become oxidized and lose their catalytic activity. The Applicant's process provides for the filling of the reforming catalyst powder into the reforming section cavity after sintering of the structure, and subsequent sealing it. In addition, wall coating is disclosed by the Applicant, yet differs from the wall coating of Furuya in that the Applicant discloses wall coating subsequent to sintering of the multiple layers.

Accordingly, the Applicant asserts that Furuya fails to disclose a sintered monolithic structure such as included within independent claims 1, 11 and 18 of the

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Applicant's claimed device. Therefore the Applicant asserts that claims 1, 11 and 18 are in a condition for allowance. The Applicant additionally asserts that claims 3, 5-8, 10, 13-16, 20 and 21 are also in a condition for allowance in that they depend from claims 1, 11, and 18, respectively. In light of the above remarks, the Applicant believes the 35 U.S.C. 102 rejection in light of the teaching of Furuya has been overcome. Notice to that effect is requested.

Claim Rejections – 35 U.S.C. § 103

The Examiner has rejected claims 4, 9, and 17 under 35 U.S.C. 103(a) as being unpatentable over Furuya, in view of Ghosh et al., U.S. Patent No. 5,961,932, hereinafter referred to as Ghosh. The Examiner in making this rejection states that with regard to the claims that Furuya discloses the fuel processor as being integrally laminated with a fuel cell stack, in addition to other elements.

The Applicant again asserts that Furuya discloses a reactor built using discrete pieces of ceramic plates, with catalyst deposited on them and being laminated together using some lamination means. The entire assembly is formed, yet separable into discrete pieces, thereby susceptible to leakage, or the like. For an assembly of this type, one would require gas tight sealing between the plates.

The Applicant asserts that the assembly of Furuya is not sintered in the manner of the Applicant's to form a monolithic device, nor would it be obvious to

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sinter, as previously stated, thereby making the combination of reference to Ghosh overcome elements claimed in dependent claims, moot.

The Applicant asserts that there is no teaching in the disclosure of Furuya to suggest the inclusion of ceramic materials that are capable of being sintered as does the Applicant, nor is there any suggestion for the modification of Furuya by the teachings of Ghosh to achieve this required element. The Applicant's claimed invention, unlike Furuya and Furuya in view of Ghosh clearly states a sintered monolithic ceramic carrier which is disclosed as being formed as a direct result of the ceramic green sheet materials chosen to form the layers. The Applicant asserts that the devices as taught by these prior art references fails to result in the device as claimed by the Applicant. The Applicant has clearly defined the ceramic material composition of the layers that comprise the device thereby resulting in a monolithic, sintered ceramic carrier.

Summary

The integral, sintered, monolithic ceramic unit disclosed and claimed by the Applicant results in a small compact unit for portable power application. As disclosed, the Applicant's device is fabricated using multilayer ceramic technology. The required features of the various components (vaporizer, reformer, combustor etc. in the fuel reformer unit) required for the final unit are processed separately on individual ceramic sheets in green state (unsintered) and then they are laminated maintaining the structural integrity and sintered to form an integral, sintered,

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monolithic ceramic unit. The unit becomes uniform in composition in that the layers are no longer discernible as individual layers due to the sintering process. The resultant monolithic structure characteristics are unique to the Applicant's device and not disclosed or taught by Furuya. To simply substitute a plurality of plates, that may have included sintering to form a catalyst support layer, but which are ultimately laminated one to the other using glass sealing, or the like, as prior art to the Applicant's claimed device is not proper.

In the Applicant's claimed device, communication between the various components is achieved by forming the required channels in the green state. This way it is possible to achieve simple and gas tight connections between the components during the sintering process, such that the only external required connections would be fuel inlet connected to the fuel tank and gas out put connected to the fuel cell. The compact design minimizes the total surface area (requiring minimum insulation around the reactor) and minimizes the losses into the surrounding through the reactor, thereby maximizing the fuel efficiency for portable power applications.

Accordingly, the Applicant respectfully disagrees with the 35 USC 102 and 103 rejections and assert that the claims are not obvious in light of the teaching of Furuya, or Furuya in view of Ghosh. The Applicant disagrees with the Examiner's assertions regarding the anticipation and obviousness and asserts that Furuya fails to disclose the integral, sintered, monolithic three-dimensional device and therefore

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additionally assert that further modification of Furuya with the teaching of Ghosh also fails to disclose the Applicant's claimed device.

Therefore the Applicant asserts that claims 1-3, 5-8, 10-16 and 18, 20 and 21 are in a condition for allowance. In light of the above remarks, the Applicant believes the 35 U.S.C. 102 and 103 rejections have been overcome. Notice to that effect is requested.

No amendment made herein was related to the statutory requirements of patentability unless expressly states; rather any amendment not so identified may be considered as directed *inter alia* to clarification of the structure and/or function of the invention and Applicant's best mode for practicing the same. Additionally, no amendment made herein was presented for the purpose of narrowing the scope of any claim, unless Applicant has argued that such amendment was made to distinguish over a particular reference or combination of references. Furthermore, no election to pursue a particular line of argument was made herein at the expense of precluding or otherwise impeding Applicant from raising alternative lines of argument later during prosecution. Applicant's failure to affirmatively raise specific arguments is not intended to be construed as an admission to any particular point raised by the Examiner.

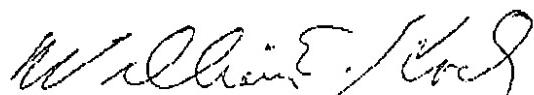
The Applicant believes that the subject application, is in condition for allowance. Such action is earnestly solicited by the Applicant. In the event that the Examiner deems the present application non-allowable, it is requested that the

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Examiner telephone the Applicant's attorney or agent at the number indicated below so that the prosecution of the present case may be advanced by the clarification of any continuing rejection.

Reconsideration is respectfully requested. In view of the foregoing amendments and remarks it is believed that the application is now in condition for allowance. Notice to that effect is respectfully requested. Authorization is hereby given to charge any fees necessitated by actions taken herein, including any extension of time fees, to Deposit Account 502117.

Respectfully submitted,



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